TITANIUM TETRACHLORIDE

Titanium tetrachloride is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 7550-45-0 $TiCl_4$

Molecular Formula: $TiCl_4$

Titanium tetrachloride is a colorless to light yellow liquid with a penetrating acid odor. It absorbs moisture from the air and evolves into dense white fumes. Titanium tetrachloride is soluble in cold water, alcohol, and dilute hydrochloric acid. Concentrated aqueous solutions are stable and corrosive. Dilute solutions can precipitate insoluble basic chlorides (Merck, 1989; Sax, 1987).

Physical Properties of Titanium Tetrachloride

Synonyms: tetrachlorotitanium; titanic chloride; titanium chloride

Molecular Weight:	189.73
Boiling Point:	136.4 ^oC
Melting Point:	-24.1 ^oC
Heat of Vaporization:	79.7 BTU/lb = 44.3 cal/g
Density/Specific Gravity:	1.726 (water = 1)
Conversion Factor:	1 ppm = 7.76 mg/m^3

(HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Titanium tetrachloride is used as a chemical intermediate in the manufacture of titanium metal, titanium dioxide, as an agent with ammonia in smoke screens, and as a polymerization catalyst. Titanium pigments can be added to glass or artificial pearls to provide an iridescent appearance (HSDB, 1991).

The primary sources of titanium tetrachloride emissions in California reported in the United States Environmental Protection Agency's (U.S. EPA) 1995 Toxics Release Inventory (TRI) Public Data Release Report were the chemical and allied products industries (U.S. EPA, 1996b).

B. Emissions

In California, approximately 1,100 pounds of titanium tetrachloride emissions were reported in the U.S. EPA 1995 TRI Public Data Release Report (U.S. EPA, 1996b).

C. Natural Occurrence

No information about the natural occurrence of titanium tetrachloride was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of titanium tetrachloride.

INDOOR SOURCES AND CONCENTRATIONS

No information on indoor sources and concentrations of titanium tetrachloride was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Titanium tetrachloride will exist in the particle phase in the atmosphere, and hence be subject to wet and dry deposition. The average half-life and lifetime for particles in the atmosphere is estimated to be about 3.5 to 10 days and 5 to 15 days, respectively (Balkanski et al., 1993; Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Although titanium tetrachloride is reported as being emitted in California from stationary sources no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to titanium tetrachloride are inhalation, ingestion, and dermal contact (Sittig, 1991).

Non-Cancer: Titanium tetrachloride forms hydrochloric acid on contact with the moist tissues of the lung and mucosa. Inhalation exposure to titanium tetrachloride may cause severe irritation to the skin, eyes, nose, and throat. Acute exposure to high concentrations may damage the cornea (U.S. EPA, 1994a).

The United States Environmental Protection Agency (U.S. EPA) has not established a Reference Concentration (RfC) or an oral Reference Dose (RfD) for titanium tetrachloride (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects in humans or animals (U.S. EPA, 1994a).

Cancer: No information is available regarding the carcinogenic effects of titanium tetrachloride in humans or animals. The International Agency for Research on Cancer and the U.S. EPA have not classified titanium tetrachloride with respect to carcinogenicity (IARC, 1987a; U.S. EPA, 1994a).